from its small adult size (SVL 30.7 mm), presence of a bright yellow vertebral stripe commencing from tip of snout and terminating near the vent and broad dark brown lateral stripes on either side from the post ocular to the inguinal region. It can be distinguished from *Kaloula taprobanica* which is larger (SVL 35–55 mm), by the presence of several black-edged reddish-brown irregular blotches on the dorsum, and absence of the bright yellow vertebral stripe. It can also be distinguished from *Kaloula pulchra* which is even larger (SVL 45–85 mm) by the yellow head, with two broad dorso-lateral elongated yellow patches on either side, and absence of yellow vertebral stripe. This collection from Valmiki Tiger Reserve extends the range of the species by about 600 km further to the west, and constitutes the first record from Bihar. It now appears that the species is distributed all along the Terai belt, from Arunachal Pradesh to Bihar (92° to 84° E), along both the Indo-Bhutan and Indo-Nepal borders.

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15. ADDITION OF THREE ANGELFISH (FAMILY: POMACANTHIDAE) TO THE ICHTHYOFAUNA OF WEST BENGAL, INDIA

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The ichthyofauna of West Bengal coastal waters has been reported by several workers (Chatterjee *et al.* 2000; Das *et al.* 2007; Goswami 1992; Khan 2003; Manna and Goswami 1985; Talwar *et al.* 1994). There is no report of family Pomacanthidae (angelfish) in these publications. However, during a survey around Digha coast we collected three species of Pomacanthidae, namely *Pomacanthus imperator* (Bloch, 1787), *P. annularis* (Bloch, 1787), and *P. semicirculatus* (Cuvier, 1831), and in this paper, we give the morphometrics and other details of the collected specimens.

Pomacanthidae is characterised by a sharp spine located at the lower front area of the gill cover, or preopercle region. The presence of this spine on each side distinguishes and separates them from their close butterflyfish (Family: Pomacanthidae) relatives, which do not have the spine. Family Pomacanthidae contain 9 genera and 74 species mainly associated with coral reefs around the world (Chen and Tzeng 2009; Froese and Pauly 2011). They do generally well in the aquarium (Rao 2003), are very good food fish and of high economic value (Barman *et al.* 2004). All the members of angelfishes are strictly marine, inhabit shallow reefs, but some live in deep water. Of these, *Pomacanthus* species, which we recorded during the survey, are reported to be cleaners, removing ectoparasites from other fish. Juveniles are extremely different in colour pattern from adults (Allen *et al.* 1998; Randall 1996), and have a very high demand in the marine aquarium trade (Rao 2003).

All three specimens of *Pomacanthus* collected were from Digha Mohona (21° 37.84' N; 87° 32.83' E). After taking photographs, the specimens were preserved in

Table 1: Morphometric characteristics of the three species of angel fish (*Pomacanthus* spp. recorded during the survey)

Character	*P. imperator*	*P. annularis*	*P. semicirculatus*
% of Standard Length			
Total Length	85.06	83.09	85.38
Body Depth	61.22	71.18	64.38
Head Length	26.12	22.71	28.08
Caudal Fin Length	17.55	20.33	17.12
Predorsal Length	36.73	37.28	39.72
Preanal Length	71.02	64.40	67.80
Pectoral Fin Length	24.08	23.05	26.02
Ventral Fin Length	29.18	29.15	33.56
Caudal Peduncle Length	5.10	6.44	12.32
Caudal Peduncle Depth	12.6	14.91	15.06
% of Head Length			
Eye Diametre	21.09	22.38	23.17
Inter-orbital	37.5	43.28	34.14
Snout	46.87	37.31	26.58
Pre-opercular	41.40	40.29	29.26

10% formaldehyde and kept in the museum of Marine Aquarium and Regional Centre of Zoological Survey of India, Digha. Three specimens, one from each species, were collected and identified as the following: *Pomacanthus annularis* – Reg. no: F1965; Date of collection: 10.x.2011, Total length: 355 mm. *Pomacanthus imperator* – Reg. no: F1972; Date of collection: 24.x.2011, Total length: 288 mm. *Pomacanthus semicirculatus* – Reg. no: F2277; Date of collection: 16.i.2012, Total length: 171 mm.

Details of morphometric characters of all the three species are presented in Table 1 and also described below:

Bluering Angelfish *Pomacanthus annularis* (Bloch, 1787)

Meristic formula: D: XIII, 21; A: III, 20; P: 19; V: I, 5; LI: 70; GR: 20.

Diagnostic Character: Body compressed and disc like; rostro-dorsal profile straight to nape; snout bluntly pointed. Body and head covered with small, rounded, ctenoid scales. Mouth small with numerous long teeth of equal size. Very small denticles present in the posterior and lower edges of pre-operculum; a strong spine present at the angle of pre-operculum. Inter-orbital space is wider than eye diameter. Lateral line arched and complete. Gill rakers 6 on upper limb and 14 on lower limb of the first arch. Anterior nostril oval, twice longer than round posterior. Soft dorsal pointed, soft anal and caudal fin rounded.

Colour: Body greyish-brown, with conspicuous 7 brilliant blue curved lines radiating from pectoral fin to soft dorsal fin, the last one crossing the caudal peduncle. Two blue horizontal lines present on opercle, the upper one crossing the eye from above the snout to the edge of the operculum and lower one below the eye. A blue ring present slightly above the edge of the operculum near lateral line. Caudal fin white with yellow margin and pectoral fins yellowish; ventral fins greyish.

Habitat: Found around reef slopes, at least 30 m depth (Lieske and Myers 1994); feeds on sponges and tunicates (Pyle 2001). Adult often found in pairs inside caves (Kuiter and Tonozuka 2001).

Distribution: The species is distributed along Indo-West Pacific: east coast of Africa, throughout Indonesia and New Guinea to New Caledonia, north to southern Japan (Froese and Pauly 2011). From Indian waters, this species was reported from Andaman and Nicobar Islands (Rao *et al.* 2000; Kamala Devi and Rao 2003; Rao 2003, 2010), Andhra Pradesh (Barman *et al.* 2004), Gulf of Mannar, Tamil Nadu (Talwar and Kacker 1984) and Gujarat (Deshmukhe *et al.* 2000).

Emperor Angelfish *Pomacanthus imperator* (Bloch, 1787)

Meristic Formula:D:XIV, 20; A: III, 20; P:19; V: I, 5; LI: 78; GR: 19.

Diagnostic character: Body oval shaped, deeply compressed; snout blunt; rostro-dorsal profile slightly convex. Body and head covered with small ctenoid scales. Head small, slightly concave in its dorsal profile. Small mouth with numerous teeth forming a brush-like surface. Anterior teeth in both jaws are the longest, no teeth in vomer and palatine. Pre-operculum finely serrated, the angular pre-opercular spine strong and longer than eye, inter-orbital space wider than eye diameter. Posterior nostril oval and slightly larger than rounded anterior nostril. Gill rakers short with 6 on upper limb and 13 on lower limb of first arch. Posterior edge of dorsal, anal and caudal fins are rounded.

Colour: Body and the adjoining dorsal and anal fins with diagonal alternating stripes of purplish-blue and narrower yellow. Snout and cheek bluish-white; eye enclosed in a black vertical bar with blue edge; greenish-grey with light blue margin extending from forehead to base of pre-opercular spine. Caudal fin yellow, a broad black bar present at the level of pectoral; pectoral and pelvic fins yellowish; soft dorsal and anal fin with numerous yellow bands.

Habitat: Emperor angelfish inhabit outer coral reefs near caves and coral ledges at depths of 5–60 m (Golani *et al.* 2010; Rao 2003). Benthopelagic (Mundy 2005). It generally feeds on sponges, tunicates, and other encrusting organisms (Anderson and Hafiz 1987). Solitary or in pairs, the male shows territoriality against conspecific males (Golani *et al.* 2010).

Distribution:The species is distributed along the Indo-Pacific, from the Red Sea and eastern Africa to Japan, Tuamoto islands, Hawaii (Golani *et al.* 2010; Randall 2007) and the Ogasawara Islands, south to the Great Barrier Reef, New Caledonia, and the Austral Islands (Fricke 1999). In Indian waters, reported from Andaman and Nicobar Islands (Kamala Devi and Rao 2003; Rao *et al.* 2000; Rao 2003, 2010), Andhra Pradesh (Barman *et al.* 2004), Lakshadweep (Murty 2002), Tamil Nadu: Cuddalore coast (Lakshmi and Sundaramanickam 2011) and Gulf of Mannar (Talwar and Kacker 1984).

Semicircular Angelfish *Pomacanthus semicirculatus* (Cuvier, 1831)

Meristic Formula: D: XIII, 21; A: III, 19; P: 20; V: I, 5; Ll: 67; GR: 18.

Diagnostic character: Body moderately compressed and deep. Rostro-dorsal profile ascending in a more or less straight line to nape, slightly concave at snout. Head small, mouth also small with numerous brush-like teeth in both jaws. Scales on body unequal and without auxiliaries. Anterior nostril is oval and larger than the rounded posterior. Hind border of pre-opercle minutely serrated; angular pre-opercular spine slightly larger than eye. Spinous dorsal fin slightly longer than soft rays; soft anal and soft dorsal fins are acute and prolonged like filaments. Lateral line arched and ends in caudal. Gill rakers short with 5 on upper limb and 13 of lower limb of first arch. Third anal spine longest; pectoral fins slightly shorter than head length; ventral fins acute and caudal fin rounded.

Colour: Mouth pale yellow. Anterior and posterior part of body brownish, yellowish-grey in the middle. Dorsal, anal, caudal fin margins, and pre-opercular edge are blue with yellowish tips; pectoral fins yellowish. Numerous blue spots on body.

Habitat: This species generally prefers protected coral reefs with developed coral to a depth of 40 m. Generally solitary or in pairs. Feeds mainly on sponges, algae, and tunicates (Allen *et al.* 1998; Randall 1996).

Distribution: The species is distributed along the Indo-West Pacific from the Red Sea and East Africa to Palau and Fiji, southern Japan to New South Wales, Lord Howe Island and New Caledonia (Allen *et al.* 1998; Randall 1996). In Indian coastal waters, it was reported from Andaman and Nicobar Is (Rao 2003); Chennai coast (Barman *et al.* 2011).

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16. RECORD OF BANDED LEOPARD BLOWFISH *AROTHRON LEOPARDUS* (DAY, 1878) (TETRAODONTIFORMES: TETRAODONTIDAE) FROM MUVATTUPUZHA RIVER, KERALA, INDIA

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Introduction

Puffer fishes are circumglobal in tropical and temperate waters (Talwar and Jhingran 1991). Most species are marine, but several enter estuaries and some live only in freshwater. *Carinotetraodon travancoricus*, the only freshwater pufferfish endemic to Kerala, was described first from Pampa river, Kerala (Hora and Nair 1941). It was later reported from the Nilgiri Biosphere Reserve in the Kerala part of Western Ghats (Easa and Shaji 1997), Mavincar in South Canara, Karnataka (Remadevi *et al.* 2000), and Muvattupuzha, Periyar, and Chalakkudy rivers of Kerala (Jameela Beevi and Ramachandran 2009). *Chelonodon patoca* belonging to the family Tetraodontidae was reported from Aghnashini river in Kritikada, Karnataka, and from Payaswani river at Eranchipuzha in Kasargod district, Kerala (Arunachalam *et al.* 1999, 2009). Recent studies of Zeena and Jameela Beevi (in press), reported the presence of *Tetraodon fluviatilis*, the Green Pufferfish from Muvattupuzha river, Kerala.

Banded Leopard Blowfish *Arothron leopardus* (Family Tetraodontidae) were recorded from the Muvattupuzha river while conducting ichthyofaunal studies from August 2010 to August 2011. According to Day (1878), *A. leopardus* occurs in the seas of India. It has also been reported from seas of India (Day 1878), Pulicat Lake (Raj *et al.* 2002), Chennai coast (Ramesh *et al.* 2008), southwest coast of India (Biju Kumar and Deepthi 2009) and Ayiramthengu, Kollam (Balasubramanian and Ajmal 2004). In addition to the report of this species from Ayiramthengu (Balasubramanian and Ajmal 2004), the occurrence of *A. leopardus* in Muvattupuzha river is an additional locality for Kerala and extends its range to the freshwater systems of Kerala.

Table 1: Biometrics of *Arothron leopardus* n=20 (in mm)

Morphometrics	Min.	Max.	Mean	S.D.
Standard length				
%SL	70	143		
Body depth	32.2	41.2	36.6	2.8
Head length	33.6	38.1	35.8	1.9
Predorsal length	68.5	77.3	72.9	2.8
Dorsal fin length	17.2	20.6	19.1	1.1
Pectoral fin length	12.6	16.5	14.7	1.3
Anal fin length	15.8	18.8	17.4	1.1
Caudal fin length	24.5	29	26.9	1.8
% HL				
Snout length	40	46.3	43.6	2.2
Eye diametre	20.8	36	26.4	5.0
Interorbital distance	44	52.1	49.0	3.0
Meristic counts				
Dorsal fin rays	11			
Pectoral fin rays	18			
Anal fin rays	9			
Caudal fin rays	11			

Twenty specimens of the species were collected from two sites, Palamkadavu and Thattaveli, in Muvattupuzha river (9° 47' 00" N; 76° 21' 00" E), in Kottayam district of Kerala by using hook and line, and drag net. The specimens were fixed in 10% formalin and preserved in alcohol. The